

temporarily held in its small diameter state, by means of for instance a collar, so that it does not assume its preprogrammed expanded form at this stage.

A further embodiment of the present invention is shown in FIGS. 8 and 9.

In this embodiment 20, the length of preprogrammed memory metal, is replaced by a section of gauze-like material 21 (FIGS. 8 and 9), enclosed within an end section 22 of the artificial tunica-intima.

The end section 22 and artificial intima-tunica are pushed over an expandable balloon 23 and a protective sheath, not shown, is brought thereover. Following introduction, the sheath is removed and the balloon 23 expanded to force the end section 22 against the wall of the blood vessel, whereby it is held in position by the stent 21, to affix with the blood vessel wall. Blood pressure forces the length of unsupported artificial intima-tunica to affix with the blood vessel wall as in the first embodiment. Following positioning, the balloon 23 is removed.

This stent 21 is preferably made from stainless steel.

The artificial tunica-intima is required to be supple, and have elastic and anti-thrombogenic qualities and is preferably porous, in order to mimic the qualities of the tunica-intima. A suitable material herefor is polytetrafluoroethylene made by Dacron.

The material for the artificial tunica-intima can be supplied with endothelial cells in order to further enhance its working as a tunica-intima.

Although the present invention refers to the introduction and placing of an artificial intima tunica, intima tunicas from the patient self and from donors may be introduced and arranged in position according to the present invention.

The present invention thus yields a simple yet efficient introduction of a new artificial inner blood vessel layer, which can be carried out in a short time and with a minimum of discomfort to the patient.

The present invention is not limited to the hereabove described and illustrated embodiments, rather within the range of the following claims, a large number of modifications and variations are conceivable.

We claim:

1. A method for replacing a section of blood vessel inner layer comprising the steps of:

forming an incision into the blood vessel;

removing a section of an inner layer of a blood vessel through the incision, wherein the removal creates at least one end flap in a remaining blood vessel inner layer;

providing an artificial blood vessel inner layer comprising a supple tubular section having inner and outer surfaces, at least one end section of said tubular section folded back over said outer surface creating an enclosure, and a stent enclosed within said enclosure;

inserting the stented end of said artificial inner layer into said blood vessel through the incision in the direction of blood flow;

positioning said artificial inner layer within said blood vessel so that said end section enclosing said stent is positioned adjacent said end at a downstream location from said incision flap; and

retaining said end flap between said end section and said blood vessel by expanding said stent.

2. A method as in claim 1, wherein said providing step comprises providing an artificial blood vessel inner layer having a tubular section comprising a fluoro carbon polymer.

3. A method as in claim 1, wherein said providing step comprises providing an artificial blood vessel inner layer having a tubular section that has a length at least as long as said removed section of blood vessel inner layer.

4. A method as in claim 1, wherein said providing step comprises providing an artificial blood vessel inner layer having a stent comprising a stainless steel gauze.

5. A method as in claim 1, wherein said providing step comprises providing an artificial blood vessel inner layer having a stent comprising a length of memory metal preprogrammed to expand at a determined temperature.

6. A method as in claim 1, wherein said providing step comprises providing an artificial inner layer having an enclosure comprising a fluid-tight enclosure.

7. A method as in claim 1, wherein said positioning step comprises positioning said artificial inner layer using a catheter.

8. A method as in claim 7, wherein said catheter comprises a guide wire and a sheath.

9. A method as in claim 7, wherein said catheter comprises a blood vessel widener.

10. A method as in claim 9, wherein said widener comprises a cone-shaped element operably attached to a distal end of said catheter.

11. A method as in claim 9, wherein said widener comprises an inflatable balloon operably attached to a distal end of said catheter.

12. A method as in claim 9, wherein said widener is wider than said end section during said inserting step and narrower than said end section after said retaining step due to said stent enclosed within said end section expanding during said expanding step.

13. A method as in claim 9, wherein said widener has substantially the same diameter as an internal diameter of said blood vessel.

14. A method as in claim 9, wherein said retaining step comprises using said widener to widen said stent in order to press said end section against said end flap.

15. A method as in claim 1, wherein said retaining step comprises retaining said end flap by expanding said stent so that an outer diameter of said tubular section is approximately equal to an inner diameter of said blood vessel.

16. A method as in claim 1, wherein the providing step comprises providing an artificial blood vessel inner layer further comprising two end sections creating two enclosures and two stents enclosed within said enclosures.

17. A method as in claim 1, further comprising the step of stitching one end section to said blood vessel.

18. A method as in claim 9, further comprising the step of bunging the blood vessel.

19. A method as in claim 18 wherein said bunging step comprises bunging said blood vessel using said widener.

20. A method as in claim 9, further comprising the step of exerting pressure outwardly on said stent with said widener during a withdrawal of said catheter from said blood vessel.